Please return to Bill Carlson

FLOOD PLAIN INFORMATION

UPPER PENITENCIA CREEK
CITY OF SAN JOSE

SANTA CLARA COUNTY, CALIFORNIA

Preliminary Report.
Not Official

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ARED FOR SANTA CLARA VALLEY WATER DISTRICT
E U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS

AUGUST 1975

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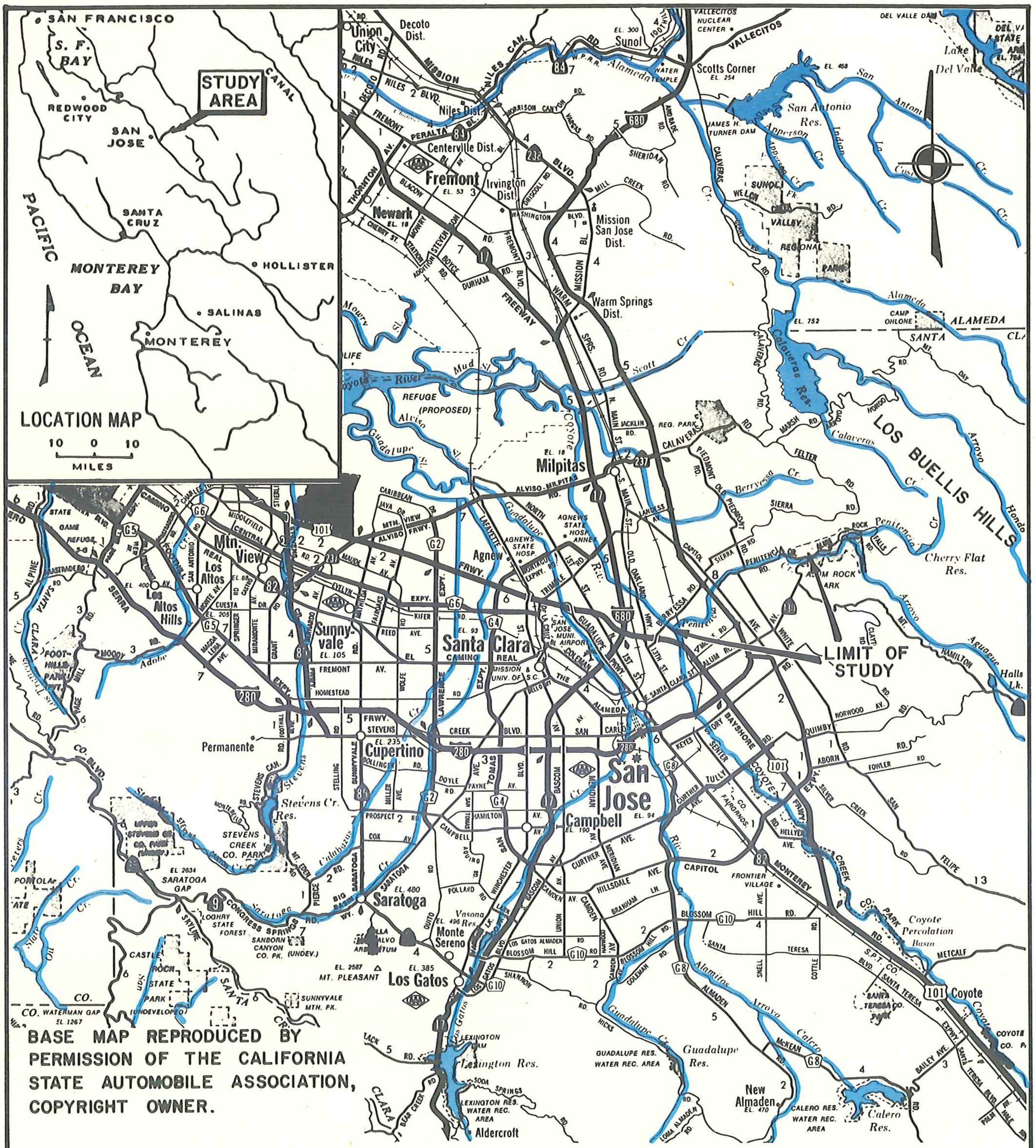


BASE MAP REPRODUCED BY PERMISSION OF THE CALIFORNIA STATE AUTOMOBILE ASSOCIATION, COPYRIGHT OWNER.

LEGEND

86 INTERSTATE HIGHWAY

76 U. S. HIGHWAY

8 STATE HIGHWAY

J3 COUNTY ROAD

0 1 2 3 4 5 6 7 8

SCALE IN MILES

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

FLOOD PLAIN INFORMATION

UPPER PENITENCIA CREEK
CITY OF SAN JOSE
CALIFORNIA

GENERAL MAP

AUGUST 1975

PLATE I

PREFACE

The area covered by this report is subject to flooding from Upper Penitencia Creek. The properties on the flood plain along this stream are agricultural and urban. However, urbanization in the basin is proceeding rapidly. The properties on the flood plain along Upper Penitencia Creek were inundated by the flood of 1958. The open spaces in the flood plain are already being subjected to pressure for development. Studies indicate that even larger floods, than those of the past are possible.

This report has been prepared because a knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. It includes a history of flooding in the Upper Penitencia Creek Basin and identifies those areas that are subject to possible future floods. Special emphasis is given to these possible future floods through maps, photographs, profiles, and cross sections. The report does not provide solutions to flood problems; however, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevent intensification of the loss problems. It will also aid in the identification of other flood damage reduction techniques such as works to modify flooding and adjustments including floodproofing which might be embodied in an overall flood plain management (FPM) program. Other FPM program studies, those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings, would profit from this information.

At the request of the Santa Clara Valley Water District and endorsement of the California Department of Water Resources, this report was prepared by the San Francisco District Corps of Engineers under continuing authority provided in Section 206 of the 1960 Flood Control Act, as amended.

Assistance and cooperation of the Santa Clara Valley Water District and private citizens in supplying useful data and photographs for the preparation of this report are appreciated.

Additional copies of this report can be obtained from the Santa Clara Valley Water District. The San Francisco District Corps of Engineers, upon request, will provide technical assistance to planning agencies in the interpretation and use of the data presented as well as planning guidance and further assistance, including the development of additional technical information.

BACKGROUND INFORMATION

Settlement 1/

Upper Penitencia Creek, a tributary of Coyote Creek, was named after the Penitencia Adobe house which stood at the highway and which probably has been used as a house of confession and penitence in mission time (Bowman). La Penitencia, apparently still the adobe house, is shown on Eld's sketch of 1841, and Arroyo de la Penitencia is shown on a diseno of the Pueblo Lands of San Jose. (1840)

Before entering the more urbanized parts of eastern San Jose, Upper Penitencia Creek flows through Alum Rock Park. The park was created by an act of the legislature in 1873 and called "the City Reservation;" later called by its present name because of the striking monolith in its center, on the sides and in the crevices of which alum dust is found.

The creek has its headwaters in the Los Buellis Hills. This is a misspelling of Los Buelles (i.e. buyes, oxen) shown on the diseno of the Pueblo Lands of San Jose, 1838.

The Stream and Its Valleys

Located in the northeasterly area of Santa Clara County, Upper Penitencia Creek flows westerly to its confluence with Coyote Creek. The watershed is bounded on the north by the Berryessa Creek drainage area, on the east by that of Arroyo Hondo and on the south by the watershed of Miguelita Creek.

Elevations in the basin range from about 3,300 feet m.s.l. in the upper section of the watershed to about 52 feet m.s.l. at its confluence with Coyote Creek.

Upper Penitencia Creek has a basin area of 24.4 square miles. About 22 square miles lie in the mountains or foothills and the rest is in the valley floor. The creek has a well defined channel where it leaves the mountains at the westerly end of Alum Rock Park, but as it approaches Coyote Creek, its natural flow capacity is reduced. Overbank flooding has historically occurred along this reach of creek and has developed an alluvial fan so that flood waters that break out of the channel flow both in a northerly and southerly direction from the creek.

Native oak, sycamore and eucalyptus grow along the banks of the creek. Although the valley floor area was once used for agricultural purposes it is now being urbanized at a rapid rate.

1/ Extracted from "California Place Names" by Erwin G. Gudde. Berkeley and Los Angeles, U.S. Press 1969.

The climate of the area is relatively mild. Temperatures range from the average high of 81 degrees in July to an average low of 49 degrees in January. Ninety percent of the rainfall occurs in the late fall and winter months with January usually having the largest amount of rainfall. Although thunderstorms do occur in the summer months, they do not contribute significantly to the annual precipitation.

The basin contains one reservoir, Cherry Flat, and two artificial recharge facilities. The recharge units are the Penitencia Creek recharge ponds and the Penitencia recharge canal.

TABLE I

DRAINAGE AREAS

Location	Drainage area sq. mi.
Upper Penitencia Creek at San Jose (nr Dorel Drive)	21.5
Upper Penitencia Creek at Toyon Avenue	22.0
Upper Penitencia Creek at San Jose (nr Intersection King and Berryessa Rd.)	22.6

Developments in the Flood Plain

The primary developments in the flood plain occur in the downstream four miles of Upper Penitencia Creek. Though much of this area is still agricultural, pressure is being exerted toward urbanization and building has occurred in areas along the creek.

From this area, upstream, Alum Rock Park lies along the stream canyon. Further upstream is the Cherry Flat Reservoir. The 60-foot earthfill dam creates a 500 acre-foot water supply reservoir having a surface area of 25 acres at the spillway crest. The earthfill dam, completed in 1936, is owned by the City of San Jose.

FLOOD SITUATION

Sources of Data and Records

The U.S.G.S. and Santa Clara County Water District maintain stream gages on Upper Penitencia Creek. The U.S.G.S. gage - 11-1721 Upper Penitencia Creek at San Jose has been in operation since 1961.

To supplement the records at the gaging stations, newspaper files, historical documents and records were searched for information concerning past floods. These records have aided in developing a knowledge of floods which have occurred in the Upper Penitencia Creek Basin.

Maps prepared for this report were based on U.S. Geological Survey quadrangle sheets entitled San Jose East, San Jose West and Calaveras Reservoir, all photo revised in 1968 and Mt. Day, Ca. 1955.

Topographic maps provided by the Santa Clara Valley Water District were used in determining the flood plains. Structural data on bridges and culverts were obtained from the Santa Clara Valley Water District, Santa Clara County Highway Department and field surveys by the San Francisco District, U.S. Army Corps of Engineer personnel.

Crest stages and discharges for known floods at gaging stations on Upper Penitencia Creek are shown in Table 2.

TABLE 2

FLOOD CREST ELEVATIONS
UPPER PENITENCIA CREEK AT PIEDMONT ROAD

Date of Crest	Estimated Peak Discharge c.f.s.	Gage Height Feet a/
January 22, 1967	1,300	7.84
December 22, 1955	1,080	6.93
April 3, 1958	1,060 b/	6.87
December 23, 1964	970	6.05

a/ Zero of gage is 199.65 feet above mean sea level datum.
b/ 0.4 miles upstream a peak flow of 2,100 c.f.s. was estimated to have occured on April 2, 1958.

Only minor flooding occurs on the creeks of the Upper Penitencia Basin system.

Flood Season and Flood Characteristics

The flood season in the Upper Penitencia Creek area extends from October through April when flooding may be caused by intense rainstorms over the basin. Runoff quantities are affected by prior rainfall, soil condition and available storage capacities in the basin reservoirs (basin reservoirs have almost no effect on flood runoff). Floodflow stages can rise from near zero to extreme flood peaks in a relatively short period of time with high velocities in the main channel.

Factors Affecting Flooding and Its Impact

Obstructions to floodflows - Natural obstructions to floodflows include trees, brush and other vegetation growing along the streambanks in floodway areas. Man made encroachments on or over the streams such as dams, bridges and culverts can also create more extensive flooding than would otherwise occur. Representative obstructions to floodflows are shown in Figures 1 through 6.

During floods, trees, brush and other vegetation growing in floodways impede floodflows, thus creating backwater and increased flood heights. Trees and other debris may be washed away and carried downstream to collect on bridges and other obstructions to flow. As floodflow increases, masses of debris break loose and a wall of water and debris surges downstream until another obstruction is encountered. Debris may collect against a bridge until the load exceeds its structural capacity and the bridge is destroyed. The limited capacity of obstructive bridges or culverts, debris plugs at the culvert mouth or a combination of these factors retard floodflows and result in flooding upstream, erosion around the culvert entrance and bridge approach embankments and possible damage to the overlying roadbed.

In general, obstructions restrict floodflows and result in overbank flows and unpredictable areas of flooding, destruction of or damage to bridges and culverts and an increased velocity of flow immediately downstream. It is impossible to predict the degree or location of the accumulation of debris; therefore, for the purposes of this report, it was necessary to assume that there would be no accumulation of debris to clog any of the bridge or culvert openings in the development of the flood profiles.

The dam on Upper Penitencia Creek, as well as the percolation ponds and canal associated with the creek system, may provide some flood reduction, as described in subsequent sections.

Upper Penitencia Creek is spanned 16 times by bridges and culverts. Pertinent information on some of the bridges can be found in Table 5. Many of these bridges are obstructive to floodflows.

Flood damage reduction measures - These measures are limited to construction and maintenance performed by local interests. Federal and State agencies have not participated in construction of formal damage prevention measures. Santa Clara Valley Water District has prepared plans for flood prevention works within the basin.

Other factors and their impacts

Flood warning and forecasting - No specific river or flood forecasts are issued for the Upper Penitencia Creek area by the Federal-State River Forecast Center in Sacramento. However, forecasts of heavy rain are provided to Santa Clara County by the NOAA, National Weather Service Forecast Office in San Francisco. General weather forecasts of rainfall with accompanying flood warnings are issued and are available by telephone, newspapers, radio and television.

Flood-fighting and emergency evacuation plans - The Santa Clara Valley Water District has organized an Emergency Operations Center. The Center consists of the Chief of Emergency Operations aided by a Public Information Officer and an Emergency Coordinator plus related support staffing. Four additional units, Data Collection, Flood Information, Water Operations, and Emergency Actions complete the organization.

The Emergency Operations Center is maintained in an "Alert" status from 1 October to 1 May each year. When the apparent situation requires 24-hour vigilance, the Center goes into a "Pre-emergency" operation. As the gravity of the situation increases and flooding is occurring and threatens to increase, a full "Emergency" condition is entered into. Upon termination of emergency conditions, the Center reverts to the "Alert" status until the situation again changes or the flood season terminates.

Under the Center operation, the Data Collection and Flood Information Units primarily collect, organize, coordinate and publish information relating to the flood situation, flooding and flood damage. The Water Operation Unit operates the water system - reservoirs, pipelines, canals, etc., in order to minimize flooding and flood damage.

The Emergency Actions Unit with available crew does all emergency maintenance within its capabilities and supervises and coordinates the work of others.

Requests for Federal and/or State aid are initiated, coordinated and supervised through the Emergency Operations Center.

Material storage on the flood plain - There are no significant amounts of floatable material stored in the flood plains of the Upper Penitencia Creek Basin. During the time of floods normal amounts of floatable materials, generally found in residential as well as rural areas, would be washed downstream. A number of the private bridges spanning the creeks of the basin system appear susceptible to destruction and floatation by floodwaters. All these materials that may be carried downstream by floodwaters could damage downstream structures as well as piling up at bridges or culverts and increasing the flood problem.

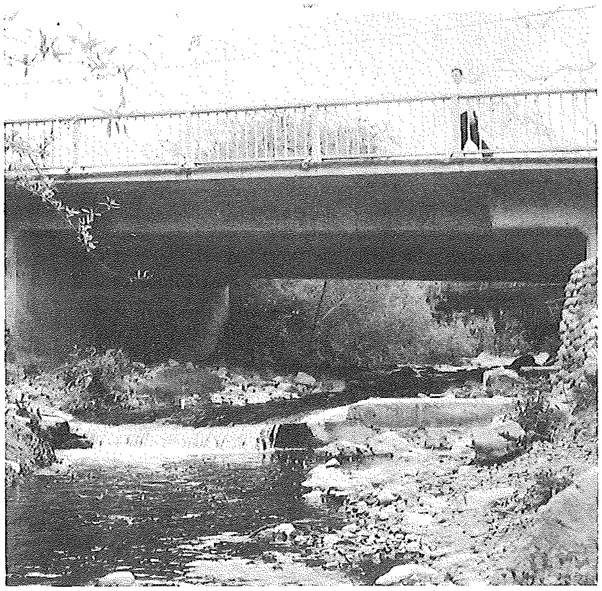


FIGURE 1 - Capitol Avenue Bridge
Upstream View

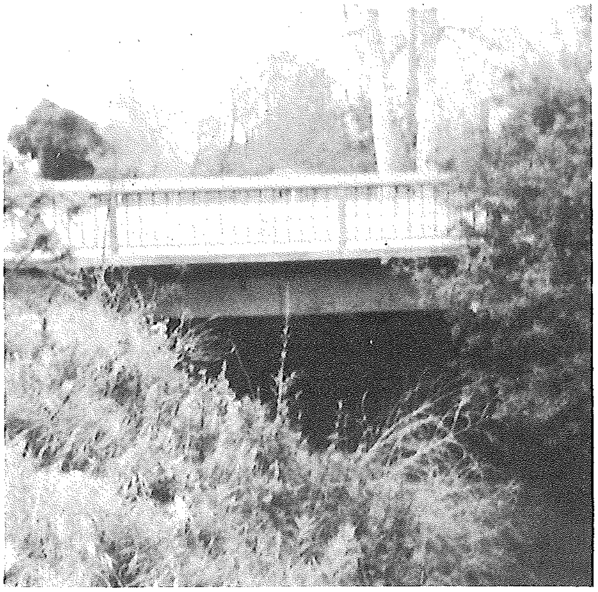


FIGURE 2 - Capitol Avenue Bridge
Downstream View

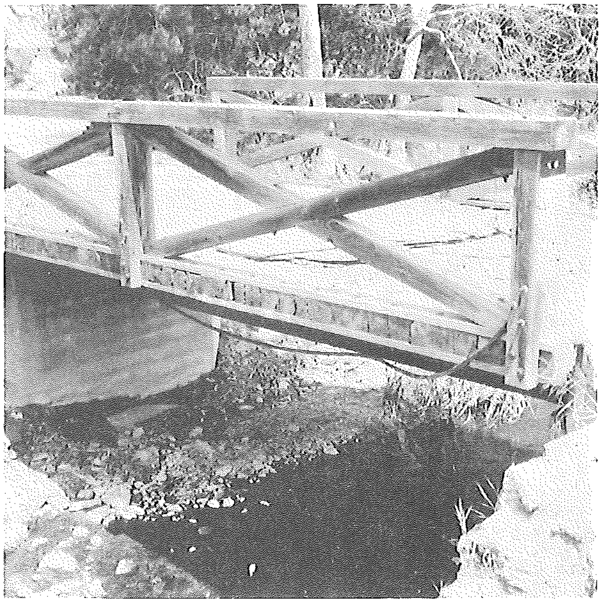


FIGURE 3 - Private Bridge at 14249 Penitencia Creek Road

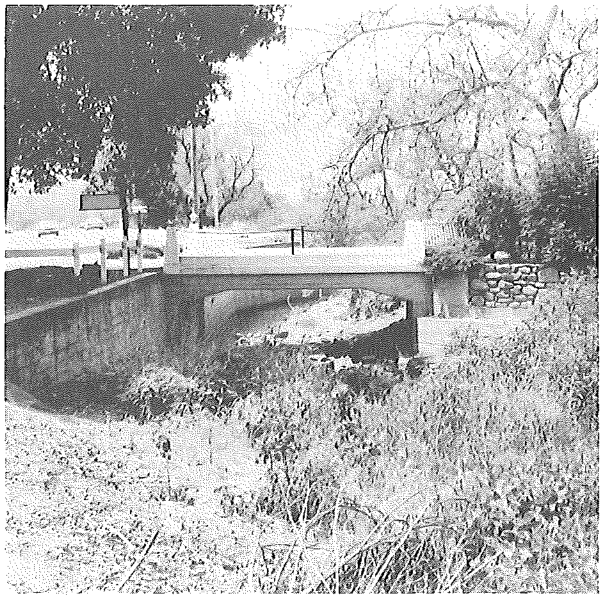


FIGURE 4 - Private Bridge at 14751 Penitencia Creek Road

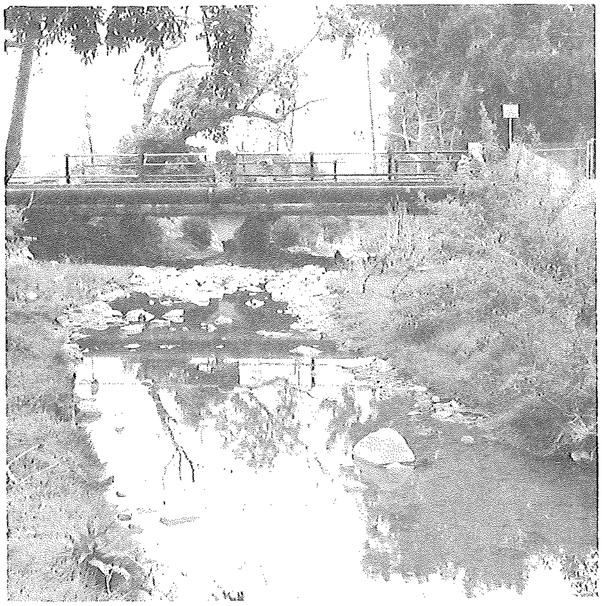


FIGURE 5 - Noble Avenue Bridge

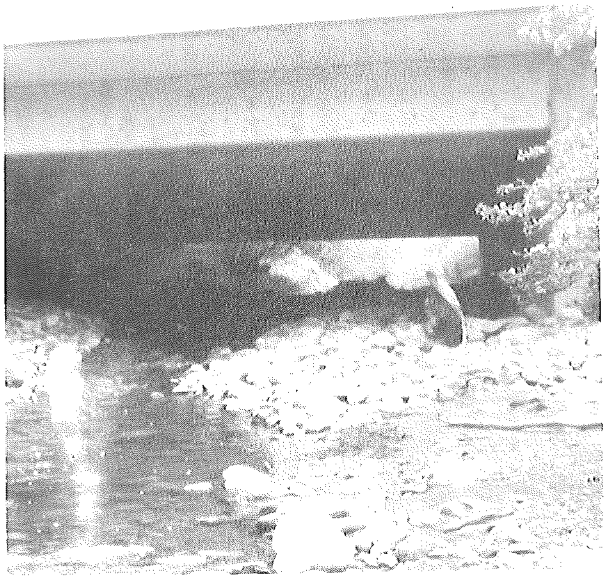


FIGURE 6 - Dorel Drive Bridge

PAST FLOODS

Summary of Historical Floods

Damaging floods that have been reported in the basin as causing significant damage occurred in 1955, 1958, 1964, 1967, 1970.

Flood Records

Information on historical floods in the Upper Penitencia Creek Basin was obtained from records taken from four stream-gaging stations. Greater emphasis was placed on the Piedmont Road Station, maintained by the Santa Clara Valley Water District. All frequency information was based on the 32 years of records at this station. The U.S.G.S. gage located 0.4 miles upstream from Piedmont Road has a shorter period of record and is located upstream from the inlet to a series of infiltration ponds.

Flood Description

During the period February-April 1958, flooding on Penitencia Creek was caused by overtopping of the levees approximately one-quarter mile upstream from the intersection of King and Mabury Roads. About 200 acres of apricot orchards, row crops, residential and industrial lands were inundated. Flooding lasted eight hours with water depths averaging about two feet. About 30 acres of truck crops consisting of cauliflower, lettuce and spinach were destroyed. Residential damage was confined to lawns.

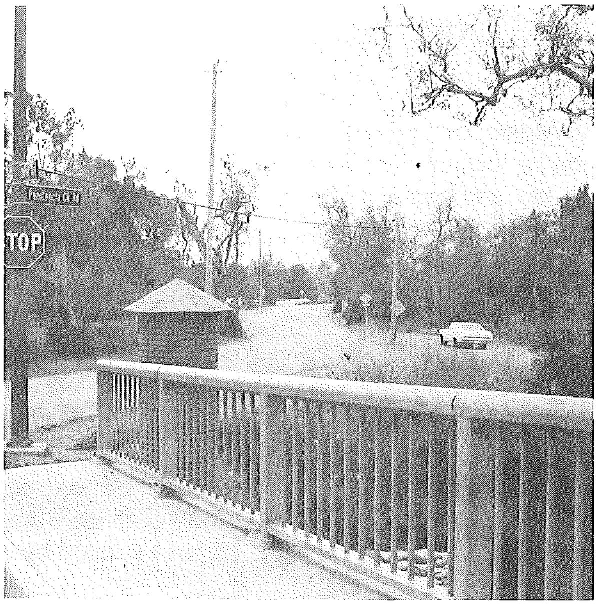


FIGURE 7 - Left Over Bank Area From Dorel Drive Bridge

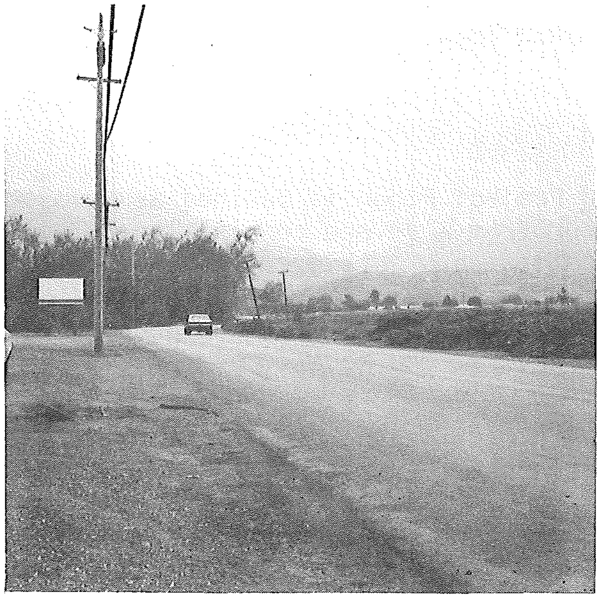


FIGURE 8 - Looking Upstream At The Left Overbank Area Near Piedmont Road

FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past could occur in the future. Larger floods have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused these floods could occur in the Upper Penitencia basin. Therefore, to determine the flooding potential of the study area, it was necessary to consider storms and floods that have occurred in regions of like topography, watershed cover and physical characteristics. Discussion of the future floods in this report is limited to those that have been designated as the Intermediate Regional Flood and Standard Project Flood. The Standard Project Flood represents a reasonable upper limit of expected flooding in the study area. The Intermediate Regional Flood may reasonably be expected to occur more frequently although it will not be as severe as the infrequent Standard Project Flood.

Intermediate Regional Flood (IRF)

A flood whose peak flow magnitude has about a one percent chance of being equalled or exceeded in any year. It is based on statistical analyses of stream flow records available for the watershed and analyses of rainfall and runoff characteristics in the general region of the watershed. The IRF would have an average frequency of occurrence of about once in 100 years. In determining the Intermediate Regional Flood for the Upper Penitencia Basin, statistical studies were made using the record of flood data from the Santa Clara Valley Water District gaging station at Piedmont Road. Peak flows thus developed for the Intermediate Regional Flood at selected locations in the study area are shown in Table 3.

Standard Project Flood

The Standard Project Flood is defined as a major flood that can be expected to occur from a severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the study area is located, excluding extremely rare combinations. The Corps of Engineers, in cooperation with the NOAA Weather Service, has made comprehensive studies and investigations based on the past records of experienced storms and floods and has developed generalized procedures for estimating the flood potential of streams. Peak discharges for the Standard Project Flood at selected locations in the study area are shown in Table 3. The relative water surface elevations for the Intermediate Regional Flood and the Standard Project Flood area are shown on Plates 7-8.

TABLE 3

PEAK FLOWS FOR INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOODS

Location	River Mile	Drainage Area Sq. Mi.	Intermediate Regional Flood Discharge c.f.s.	Standard Project Flood Discharge c.f.s.
Piedmont Road	3.2	21.8	4,190	4,800
At Junction with Coyote Creek	0.0	24.4	4,580	5,250

Table 4 shows a flood elevation comparison between the April 1958, the Intermediate Regional, and the Standard Project Flood on Upper Pentitencia Creek near Dorel Drive Bridge.

TABLE 4

FLOOD ELEVATIONS
(Upper Penitencia Creek)

Flood	Elevation a/
Standard Project	277.5
Intermediate Regional	276.7
2 April 1958	275.4*

a/ Feet, mean sea level datum.
* Obtained by backwater study. No gage reading available for this flood.

Frequency

A frequency curve of peak flows was constructed on the basis of available information and computed flows of floods up to the magnitude of the Standard Project Flood. The frequency curve thus derived, which is available on request, reflects the judgement of engineers who have studied the area and are familar with the region; however, it must be regarded as approximate and should be used with caution in connection with any planning of flood plain use. Floods larger than the Standard Project Flood are possible but the combination of factors necessary to produce such large flows would be extremely rare.

Hazards of Large Floods

The extent of damage caused by any large flood depends on the depth and duration of flooding, velocity of flow, and rate of rise. An Intermediate Regional or Standard Project Flood in the Upper Penitencia Basin would result in inundation of residential and commercial establishments downstream in San Jose.

The hazards from great floods cannot be entirely expressed as tangibles. Although relationships, such as depth and velocity of flow, rate of rise and duration of flooding are a measure of the hazard, other less tangible factors must be considered. The amount and extent of damage caused by any flood depends also on the topography of the area flooded and developments in the flood plain. Deep floodwater flowing at high velocity and carrying floating debris would create conditions hazardous to persons or vehicles attempting to cross flooded areas. Hazardous flood conditions are relative to the size of the persons or objects experiencing the hazard. When potential loss of life is a factor, velocity of flow greater than two and a half feet per second, combined with depths of flow of one foot or more, must be considered hazardous; and if small children are involved, these figures may be excessive. Structural hazard generally begins when floodwaters first enter the structure or when the situation changes from nuisance to serious. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed or in vehicles that are ultimately submerged. Waterlines can be ruptured by deposits of debris and the force of floodwaters, creating the possibility of contaminated domestic water supplies. Ruptured oil pipelines could result in contamination of flood plain areas. Decaying flood-deposited garbage or other organic materials could create health hazards. Isolation of areas by floodwater could create hazards in terms of medical, fire, or law enforcement emergencies.

Flooded areas and flood damages - The areas in the Upper Penitencia Creek Basin that would be flooded by the Standard Project Flood are shown on Plate 2, which is also an index map to Plates 3 through 6. The actual limits of these overflow areas may vary somewhat from those shown on the maps because of the contour interval and scale of the maps do not permit precise plotting of the flooded area boundaries. The area that would be flooded by the Intermediate Regional and Standard Project Floods include commercial and residential sections and the associated streets, roads and private and/or public utilties in the areas. Considerable damages to these facilities would occur during an Intermediate Regional Flood. However, due to the wide extent, greater depths of flooding, higher velocity flow and longer duration of flooding during a Standard Project Flood, damage would be even more severe than during an Intermediate Regional Flood. Plates 7 and 8 show water surface profiles of the Intermediate Regional and Standard Project Floods. Depth of flow in the channel can be estimated from these illustrations. Typical cross sections of the flood plain at selected locations, together with the water surface elevation and lateral extent of the Intermediate Regional and Standard Project Floods are shown on Plates 9 and 10.

Obstructions - During floods, debris collecting on bridges and culverts could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Intermediate Regional and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collecting against the structures, or by deposition of silt in the stream channel under the structures. Of the 16 bridges and culverts crossing the streams in the study area, most of them would be obstructive to the Intermediate Regional Flood and even more are obstructive to the Standard Project Flood. In some cases, bridges may be high enough so as not to be inundated by floodflows; however, the approaches to these bridges may be at lower elevations and subject to flooding and rendered impassable. Table 5 lists water surface elevations at selected bridges and culverts that may be restrictive during floodflows.

TABLE 5

ELEVATION DATA - UPSTREAM FACE BRIDGES ACROSS PENITENCIA CREEK a/

Location	Mileage Above Mouth	Underside Elevation a/	Water Surface Intermediate Regional Flood a/	Elevation Standard Project Flood a/
Flea Market	0.2	76.2	72.4	72.4
Flea Market	0.3	76.1	78.0	78.0
W.P.R.R.	0.4	78.0	81.3	81.3
King Road	0.7	91.5	89.8	89.8
Mabury Road	1.1	106.0	103.1	103.1
Mabury Road	1.4	117.0	115.6	115.6
U.S. Hwy # 680	2.0	143.5	139.7	140.3
Capitol Ave.	2.2	150.6	153.7	154.1
Piedmont Road	3.2	209.0	210.2	210.6
Noble Ave.	3.8	238.3	243.6	244.5
Dorel Drive	4.1	277.7	279.1	279.5

a/ Feet mean sea level datum.

Velocities of flow - Water velocities during floods depend largely on the size and shape of the cross sections, conditions of the stream, and the bed slope, all of which vary on different streams and at different locations on the same stream. During an Intermediate Regional Flood, velocities of main channel flow in the upper reaches of the streams in the study area would be 7 to 16 feet per second. Water flowing at this rate is capable of causing severe erosion to streambank and fill around bridge abutments and transporting large objects. In the lower reaches, the velocities would be somewhat lower, averaging 4 to 9 feet per second. It is expected that velocity of flow during a Standard Project Flood would be slightly higher than during an Intermediate Regional Flood. Overbank flow for all the streams would average 1 to 3 feet per second. Water flowing at 2 feet per second or less would deposit debris and silt.

Rates of rise and duration of flooding - Intense rainfalls that accompany severe storm fronts usually produce the floods occurring in the Penitencia Creek Basin. There is a time lag of at least several hours to half a day before overbank flooding occurs in the downstream areas. Floods generally rise rapidly and stay out of banks for short periods of time. For the Intermediate Regional and Standard Project Floods on Upper Penitencia Creek, Table 6 gives the maximum rate of rise, height or rise (from critical stage level to floodflow level), time of rise (time period corresponding to height of rise), and duration of critical stage (period of time flooding is above critical stage level).

TABLE 6

RATES OF RISE AND DURATION
PENITENCIA CREEK
UPSTREAM OF CAPITOL AVENUE BRIDGE

Flood	Maximum Rate of Rise ft/hr.	Height of Rise ft	Time of Rise hrs	Duration of Critical Stage hrs
Intermediate Regional Flood	1.5	2.1	2.8	10.5
Standard Project Flood	1.8	2.6	3.0	12.0

Photographs, future flood heights - The levels that the Intermediate Regional and Standard Project Floods are expected to reach at various locations in the Upper Penitencia Creek Basin are indicated on the following photographs.

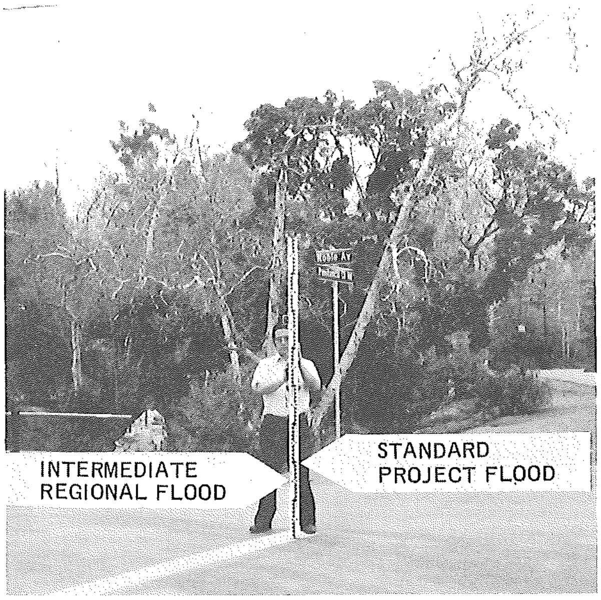


FIGURE 9 - Potential Flooding At Noble Avenue And Penitencia Creek Road

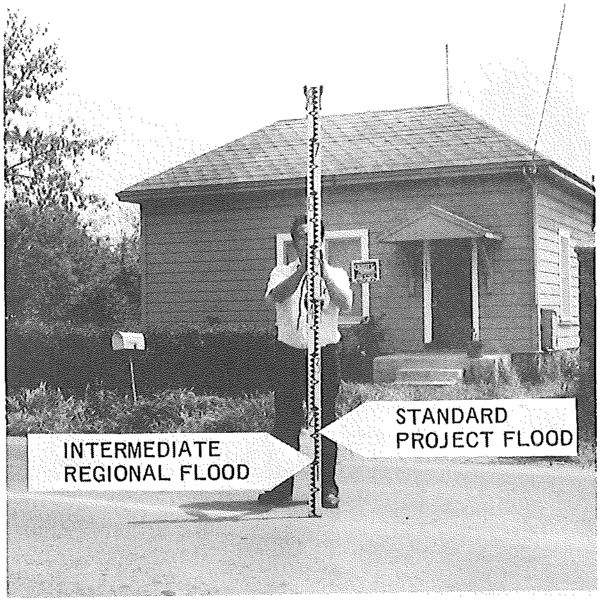


FIGURE 10 - Potential Flooding at 12540 Mabury Road

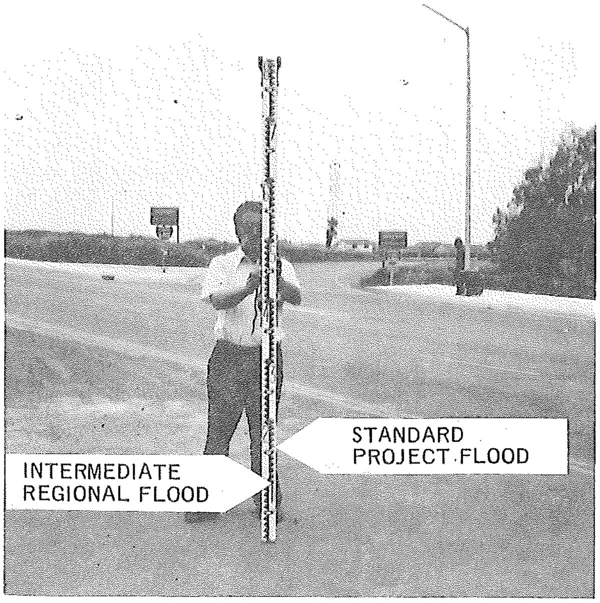


FIGURE 11 - Potential Flooding At The Approach Ramp To U.S. Highway 680 And Berryessa Road

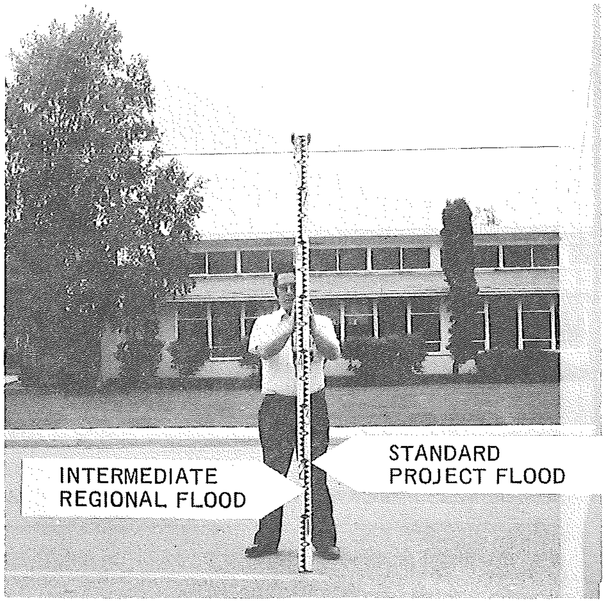


FIGURE 12 - Potential Flooding At Toyon School

GLOSSARY

Flood. The general and temporary condition of partial and complete inundation of normally dry land areas from the overflow of stream, river, or other inland waterways. Flooding may also result from tidal surges, abnormally high tidal water, tsunamis or rising coastal waters that result from hurricanes or other severe storms.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge rate of a flood at a given location. It usually occurs at or near the time of maximum stage or crest.

Flood Plain. The relatively flat area or low land adjoining the channel of a river, stream, watercourse, ocean, lake or other body of standing water, which has been or may be covered by floodwater.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as the distance upstream from the mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for consideration at a given time or stage.

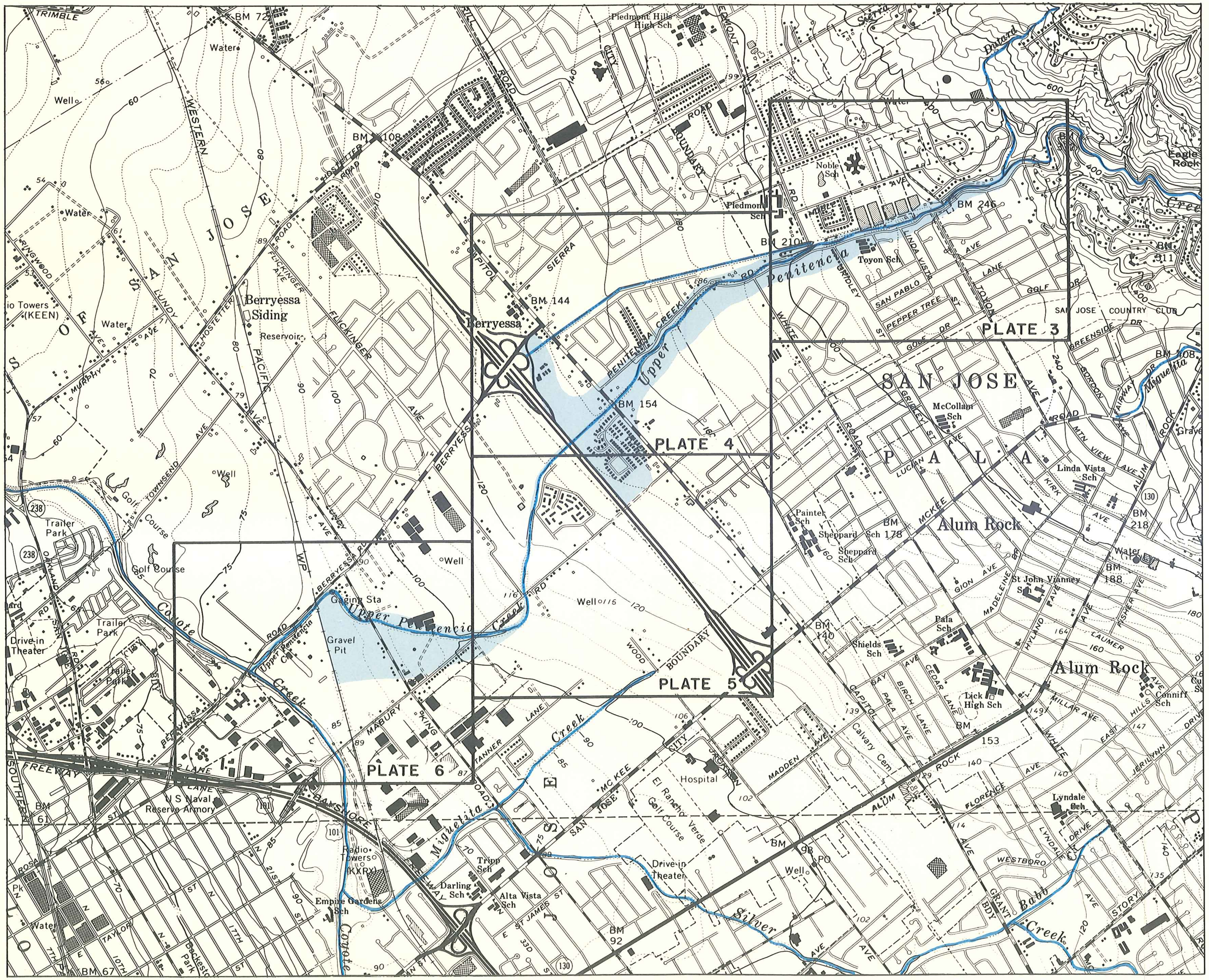
Flood Stage. The stage of elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area under consideration.

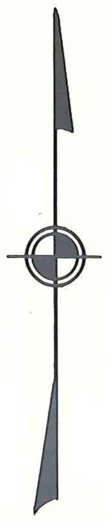
Intermediate Regional Flood. A flood whose peak flow magnitude has about a one percent chance of being equalled or exceeded in any year. It is based on statistical analyses of stream flow records available for the watershed and analyses of rainfall and runoff characteristics in the general region of the watershed. The IRF would have an average frequency of occurrence of about once in 100 years.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region in which the drainage basin is located, excluding extremely rare combinations. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of food control works, the failure of which might be disastrous.

Right or Left Bank. The bank on the right or left side of the river, stream, or watercourse looking downstream.

Underclearance Elevation. The elevation at the top of the opening of a culvert, or other structure through which water may flow along a watercourse.





SCALE IN FEET

4000 0 4000 8000

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FLOOD PLAIN INFORMATION

UPPER PENITENCIA CREEK
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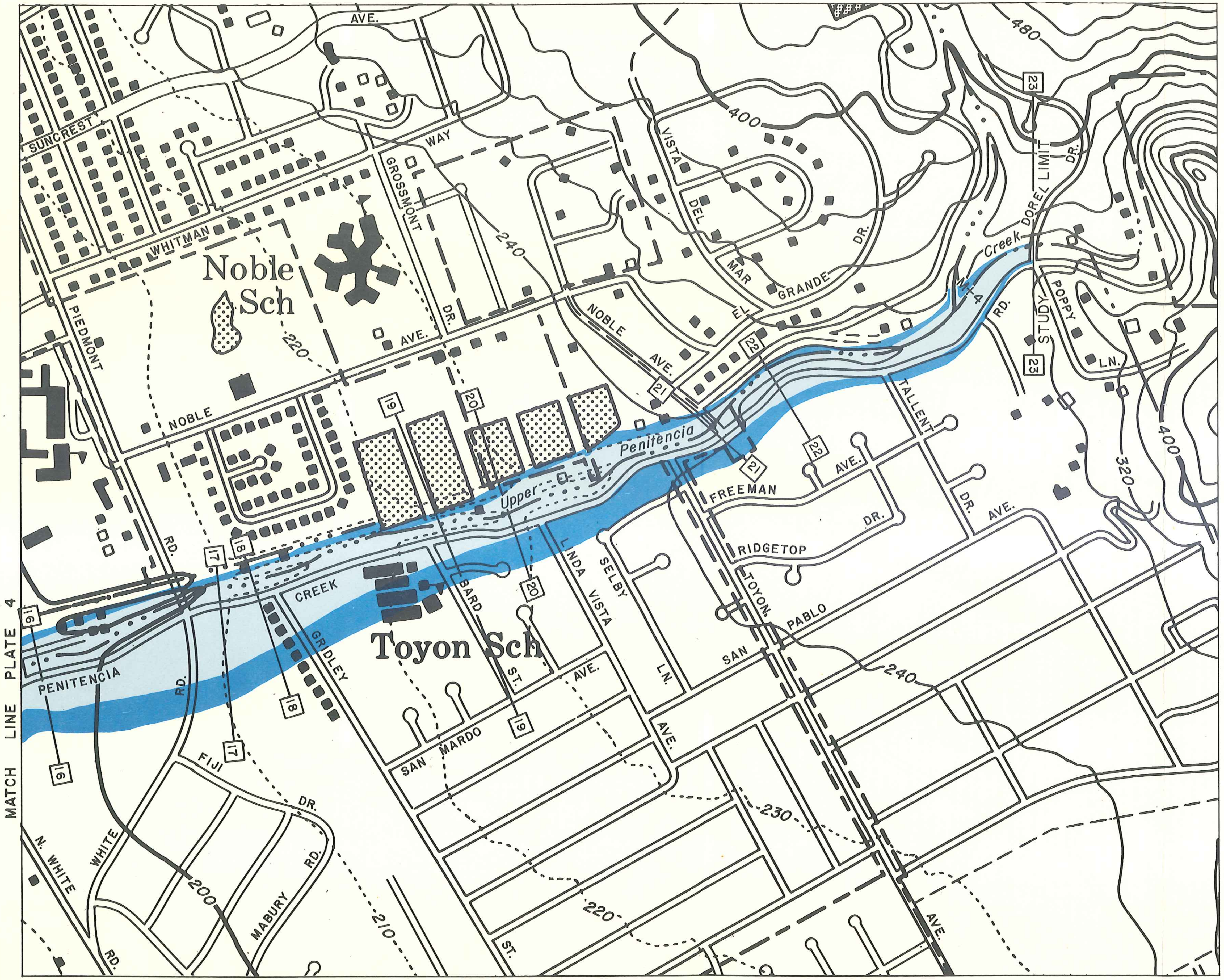
INDEX MAP - FLOODED AREA

AUGUST 1975



LEGEND

OVERFLOW LIMITS

▨	INTERMEDIATE REGIONAL FLOOD	STANDARD PROJECT FLOOD
M+4	MILES ABOVE MOUTH	
22	CROSS SECTION	
—260—	GROUND ELEVATION IN FEET SEA LEVEL DATUM	
	CHANNEL	

LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.

AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.

MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 500 1000 1500

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UPPER PENITENCIA CREEK
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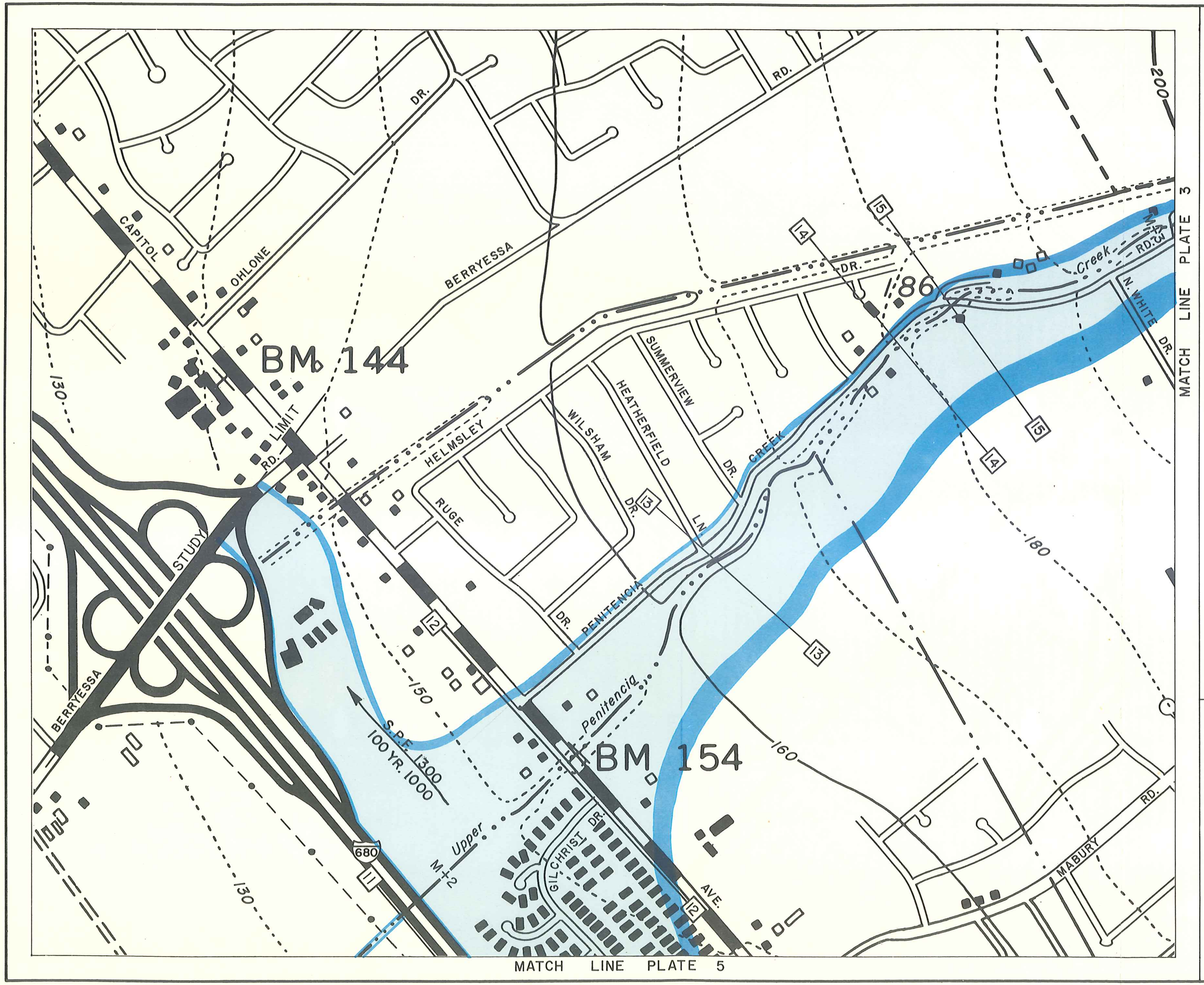
FLOODED AREAS
AUGUST 1975

PLATE 3



LEGEND

OVERFLOW LIMITS

🟦	INTERMEDIATE REGIONAL FLOOD	STANDARD PROJECT FLOOD
M+4	MILES ABOVE MOUTH	
22	CROSS SECTION	
—260—	GROUND ELEVATION IN FEET SEA LEVEL DATUM	
═══	CHANNEL	
S.P.F. 1300 100 YR. 1000	FLOOD FLOW IN CUBIC FEET PER SECOND THAT DOES NOT RE-ENTER UPPER PENITENCIA CREEK	

LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.

AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.

MINIMUM CONTOUR INTERVAL IS 10 FT.

SCALE IN FEET

0 500 1000 1500

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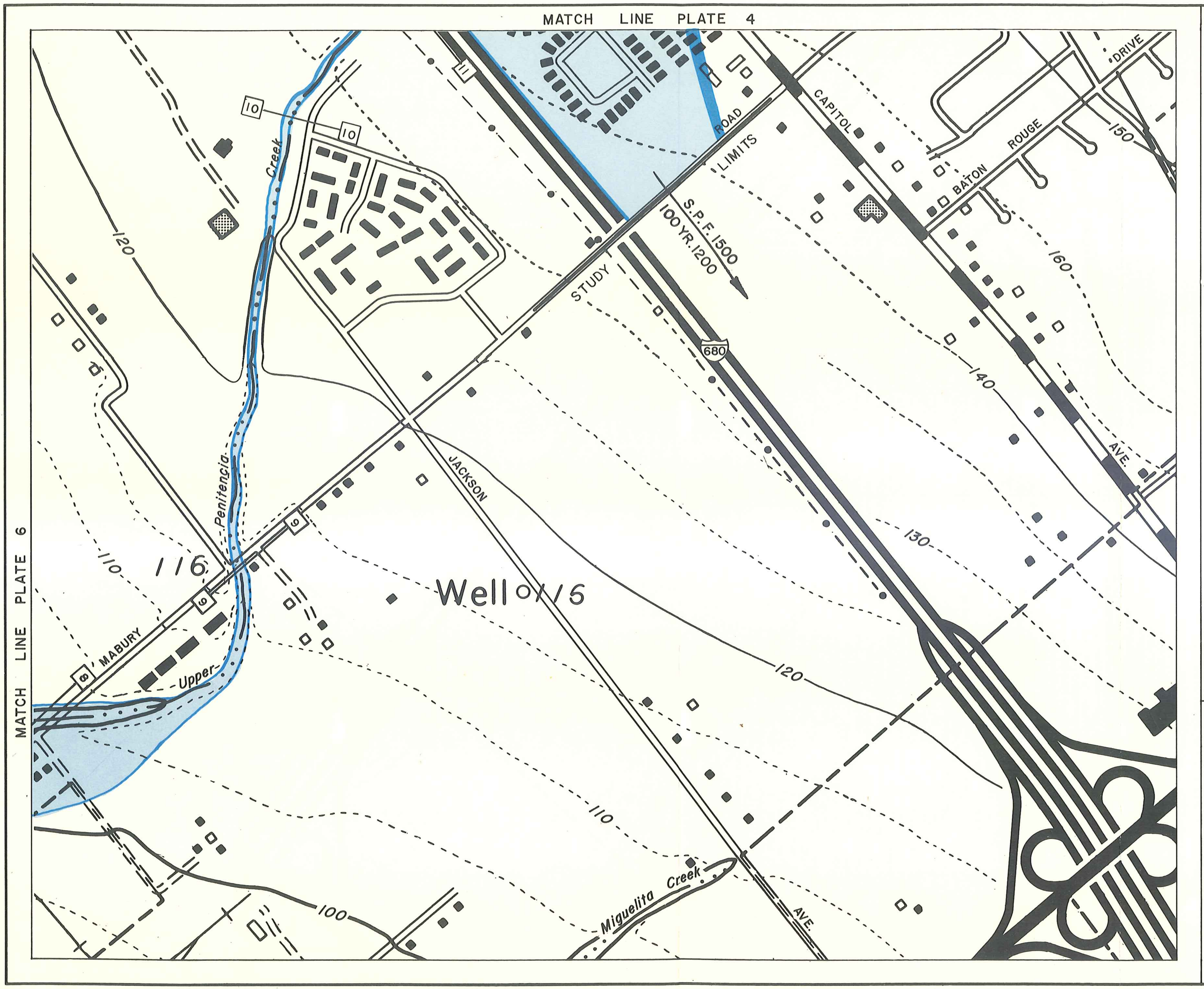

LEGEND

OVERFLOW LIMITS

▬	INTERMEDIATE REGIONAL FLOOD	STANDARD PROJECT FLOOD
M+4	MILES ABOVE MOUTH	
22	CROSS SECTION	
—260—	GROUND ELEVATION IN FEET SEA LEVEL DATUM	
═	CHANNEL	
S.P.F. 1500 ← 100 YR. 1200	FLOOD FLOW IN CUBIC FEET PER SECOND THAT DOES NOT RE-ENTER UPPER PENITENCIA CREEK.	

LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.

AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.

MINIMUM CONTOUR INTERVAL IS 5 FT.

SCALE IN FEET

0 500 1000 1500

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UPPER PENITENCIA CREEK

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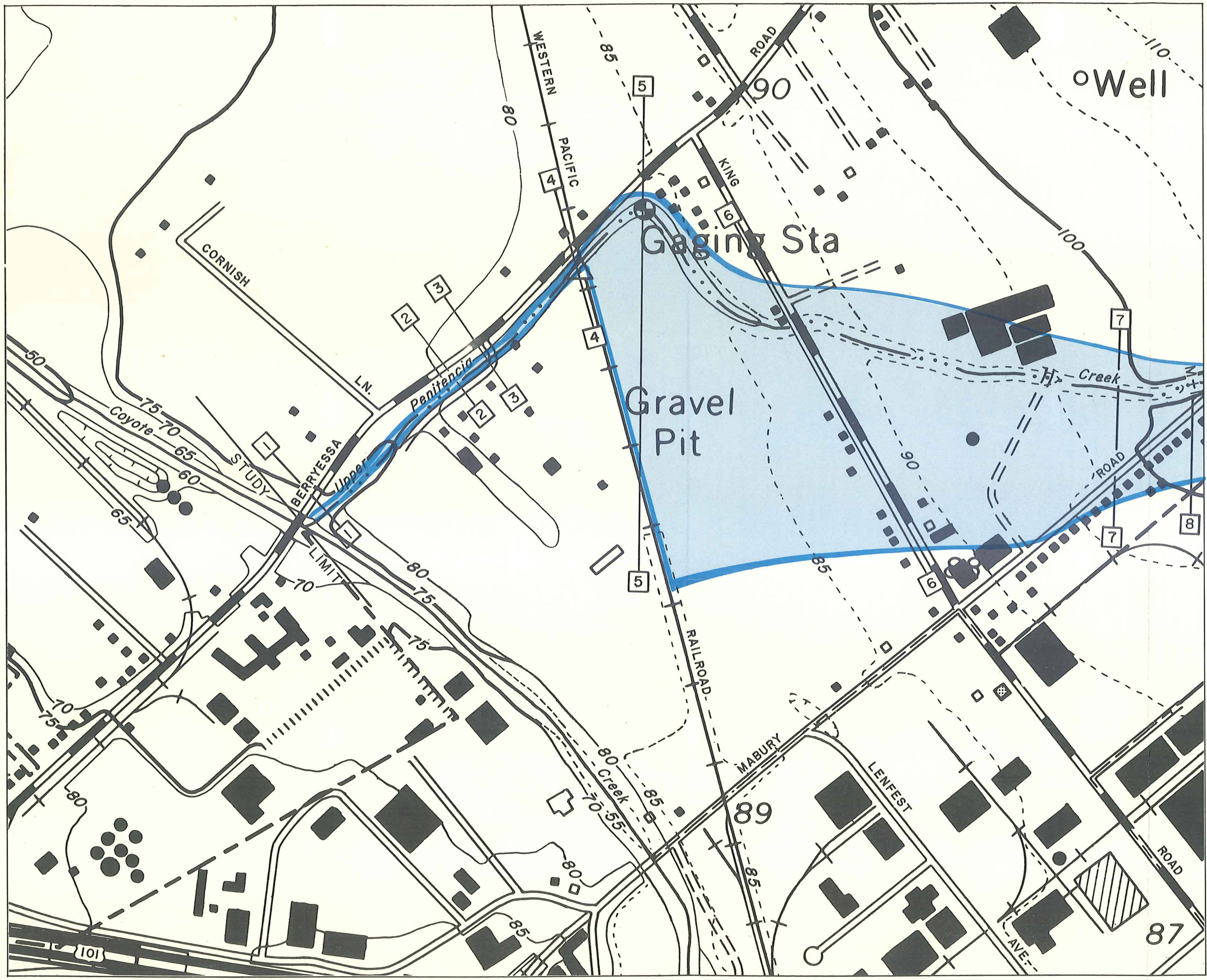

LEGEND

OVERFLOW LIMITS

INTERMEDIATE REGIONAL FLOOD } STANDARD PROJECT FLOOD

M+4 MILES ABOVE MOUTH

22 CROSS SECTION

260 GROUND ELEVATION IN FEET SEA LEVEL DATUM

CHANNEL

LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.

AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.

MINIMUM CONTOUR INTERVAL IS 5 FT.

SCALE IN FEET

0 500 1000 1500

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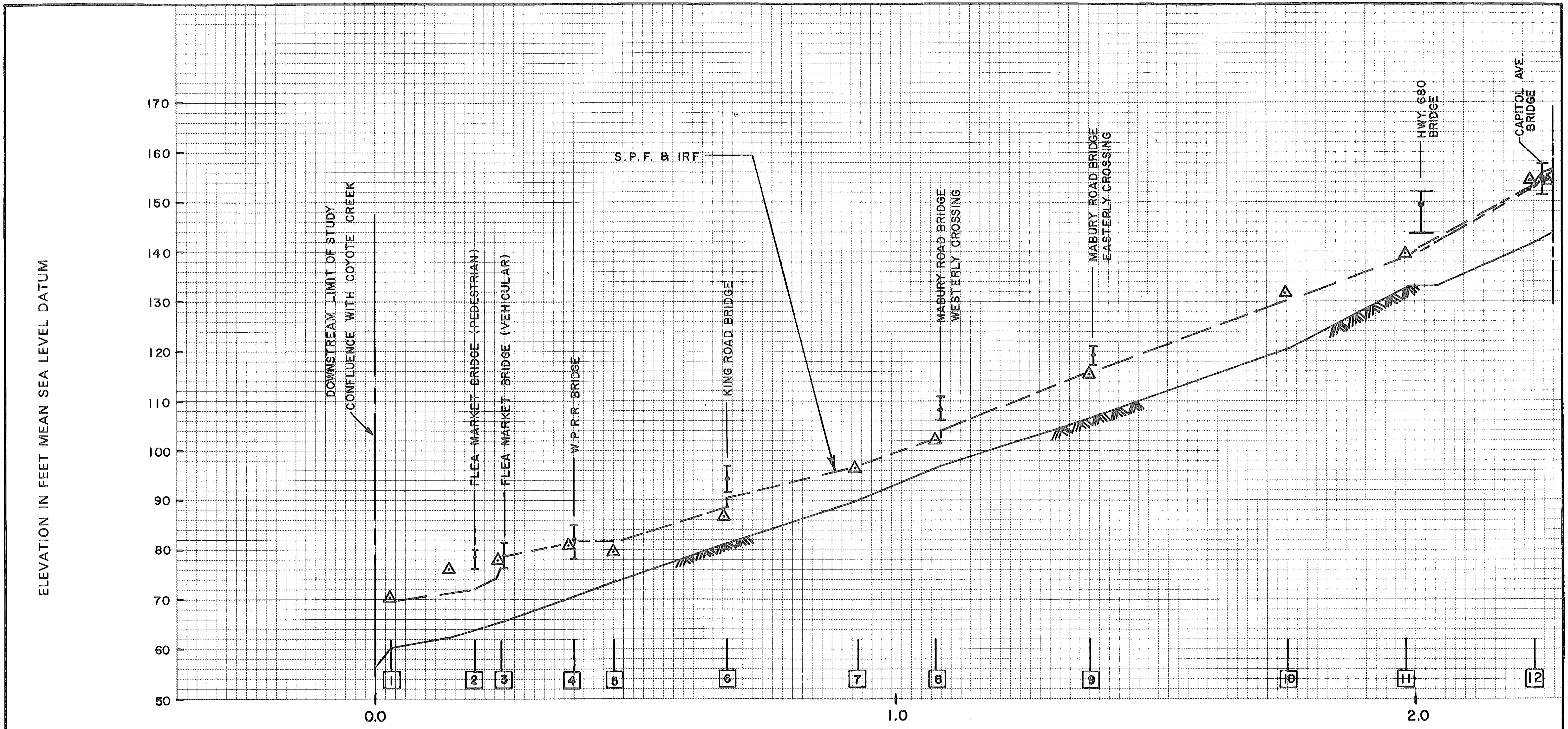
PLATE 6



LEGEND

TOP OF BRIDGE RAILING
BRIDGE FLOOR
UNDERCLEARANCE
TOP OF RAIL (RAILROAD BRIDGE)
△ TOP OF LOW BANK
—— STANDARD PROJECT FLOOD
------ INTERMEDIATE REGIONAL FLOOD

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HIGH WATER PROFILES
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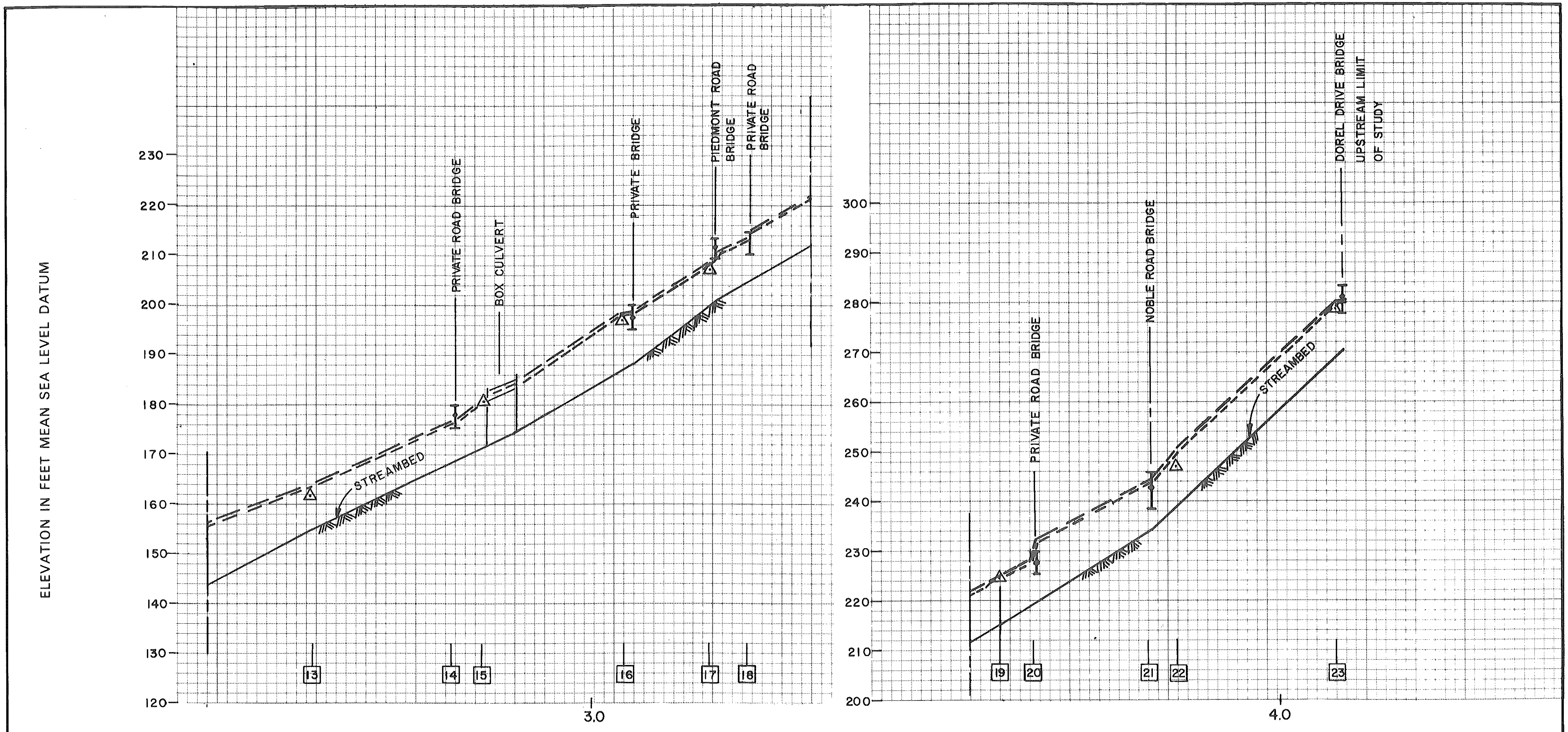
PLATE 7



MILES ABOVE MOUTH

LEGEND

- ⌶ TOP OF BRIDGE RAILING / BRIDGE FLOOR / UNDERCLEARANCE
- ⫯ TOP OF RAIL (RAILROAD BRIDGE)
- △ TOP OF LOW BANK
- — — — — STANDARD PROJECT FLOOD
- - - - - - INTERMEDIATE REGIONAL FLOOD

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HIGH WATER PROFILES

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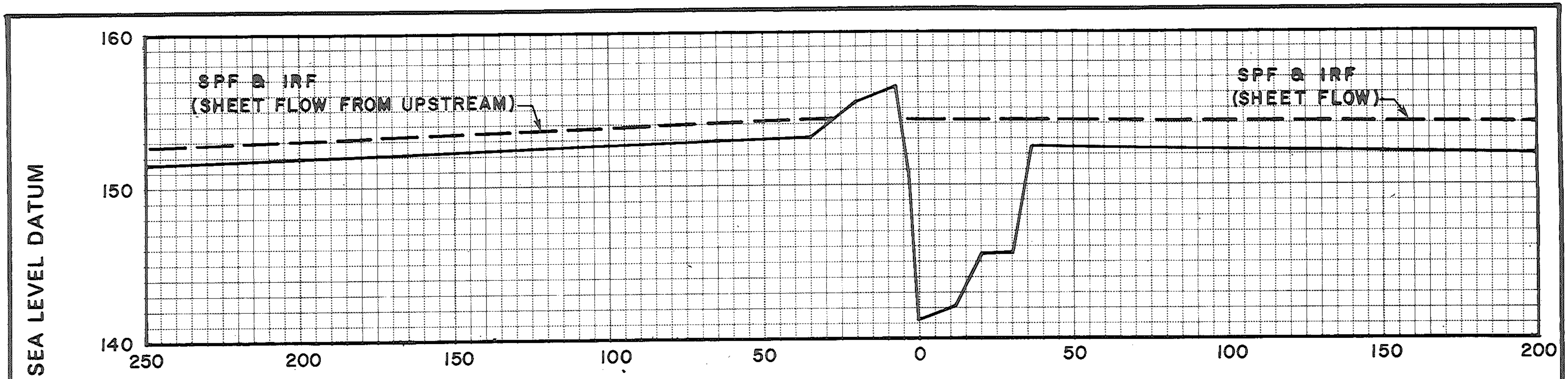
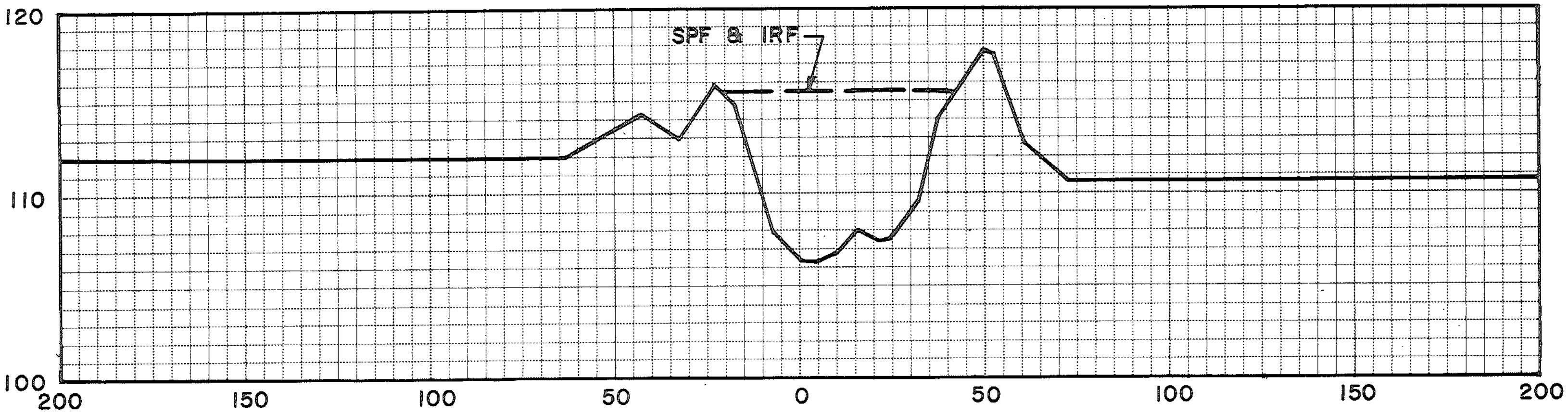
PLATE 8



CROSS SECTION NO. 12

RIVER MILE 2.21



CROSS SECTION NO. 9

RIVER MILE 1.38

LEGEND

——— STANDARD PROJECT FLOOD

- - - - - INTERMEDIATE REGIONAL FLOOD

SECTIONS TAKEN LOOKING DOWNSTREAM

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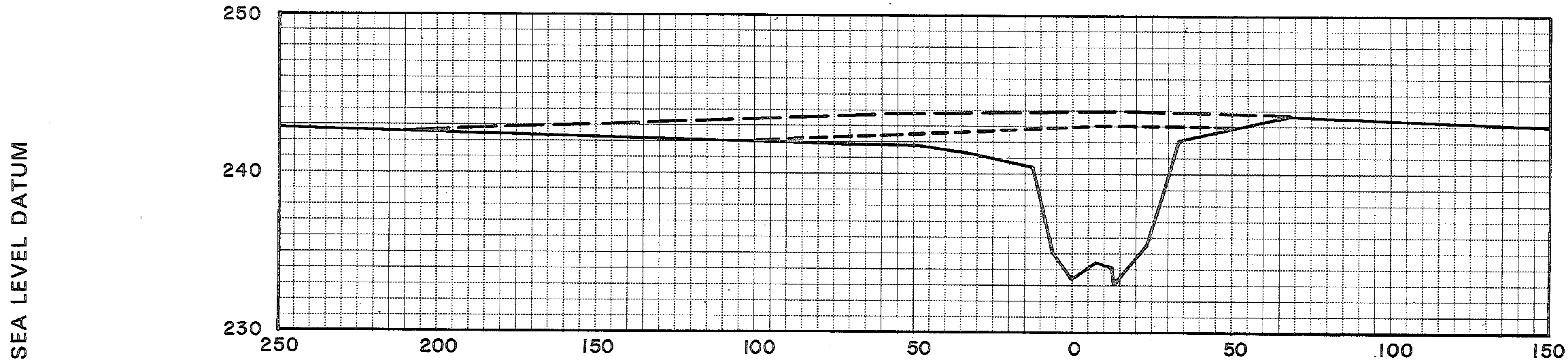
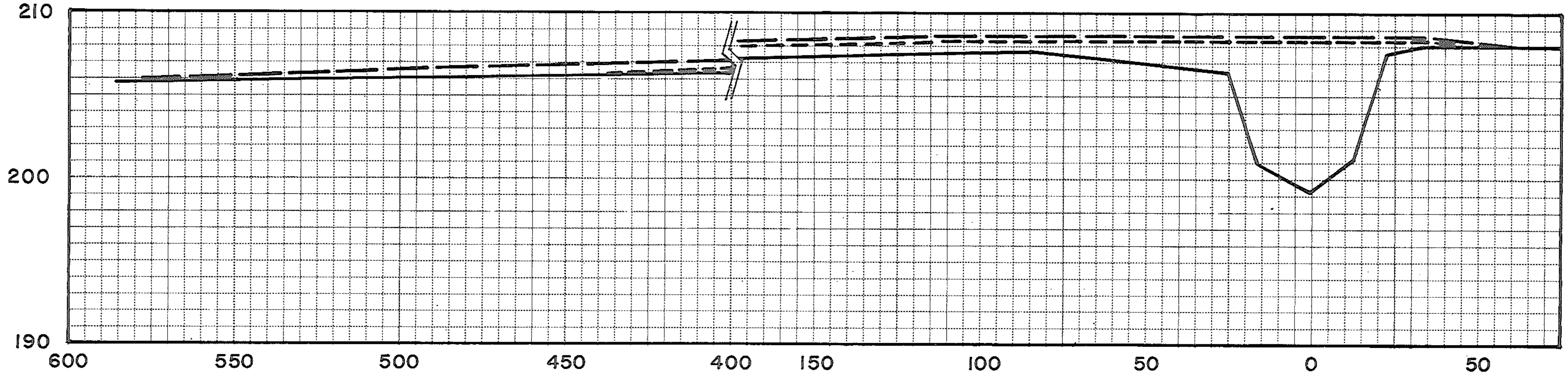
SELECTED CROSS SECTIONS
UPPER PENITENCIA CREEK
AUGUST 1975



CROSS SECTION NO. 21
RIVER MILE 3.76



CROSS SECTION NO. 17
RIVER MILE 3.23

LEGEND

——— STANDARD PROJECT FLOOD
- - - - INTERMEDIATE REGIONAL FLOOD
SECTIONS TAKEN LOOKING DOWNSTREAM

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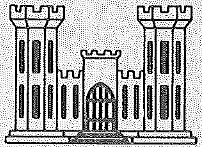

F.P.I. UPPER PENITENCIA CREEK, CITY OF SAN JOSE, SANTA CLARA COUNTY, CALIFORNIA